PRESENCE OF INSTRUCTION REGARDING TECHNOLOGY LEADERSHIP IN TEXAS UNIVERSITY PRINCIPAL PREPARATION PROGRAMS: AN EXPLORATORY STUDY

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This study investigated the presence of technology leadership components in Texas principal preparation programs. Programmatic and course information of principal preparation programs holding accreditation with Texas Education Agency were analyzed to determine presence of technology leadership instruction. Results were compared with Shrum et al.'s 2011 research, and showed a slight increase in presence. This study also examined possible differences in technology leadership components based on if the course was delivered online, face-to-face, or blended. Results showed a stronger presence of technology leadership in online courses. Additionally, the degree of alignment of technology leadership components being taught in principal preparation programs in Texas with the International Society for Technology in Education was explored. Results showed a positive correlation between technology leadership components instruction with the International Society for Technology in Education.

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CHAPTER 1

INTRODUCTION

Introduction to the Problem

The presence of technology in K-12 schools is increasing at an ever-rapid rate (Herold, 2016). The estimated instructional technology spending forecast by schools in the United States in 2017 is set at $26 billion dollars (Miller, 2017). As a result, the role of school principal has the increasingly complex task of incorporating technology into the campus to support teaching, learning, and day-to-day operations (Metcalf & LaFrance, 2013). Although there are many important components that influence whether technology will be used well in a school system, technology leadership has been identified as a crucial factor in improving student achievement (Anderson & Dexter, 2005; Machado & Chung, 2015). In order to be effective in technology leadership, the systems' principals must be technologically competent, understand the power technology has to increase learning, gain the trust of their teachers, and build a 21st century vision for their campus that aligns with district and state curriculum goals (Wells et al., 2001). Leonard and Leonard (2006) argued "the quality of technology integration in our schools is likely to be determined by the caliber of leadership to sustain it" (p. 223).

While strong technology leadership should result in a flourishing 21st century learning environment, poor technology leadership will result in frustrated teachers and students, decreased learning, and increased cost to tax-payers (Whitehead, Jensen, & Boschee, 2013). In a 21st century education system, technology leadership plays a central role in K-12 public schools (Wells et al, 2001). There is supporting research, however, that points to administrators expressing a lack of preparedness from their graduate preparation programs in the area of technology leadership (Duncan, 2011; Hayashi & Fisher-Adams, 2015; Yu & Prince, 2016).

Young and Brewer (2008) argued "schools rely on university principal preparation programs to train and develop the next generation of school leaders, indeed, the responsibility for leadership preparation falls squarely on the shoulders of higher education" (p. 106). The dissertation study explored to what degree, if any, technology leadership instruction exists in principal preparation programs in Texas universities. The specific research questions in this study were:

1. To what degree do Texas universities address the topic of technology leadership in their principal preparation programs?
2. How do various principal preparation programs in Texas correlate with the International Society for Technology in Education principal standards in the area of technology leadership?
3. Are there differences in the amount of instruction regarding technology leadership among online, face-to-face, and blended programs in Texas?

Statement of the Problem

Although viewed by many as a critical component of leading education organizations in 21st Century learning and an expressed need among principals, technology leadership is minimally addressed in most state licensure requirements for principal certification (Schrum, Galizio, & Ledesma, 2011). Due to the decentralization of government, states have the authority to specify criteria for the licensure and certification of school principals (Administrator License Requirements, Portability, Waivers and Alternative Certification, 2007). As a result, there are vast differences in requirements and regulation in terms of technology leadership development among states (Davis, 2010).

The exploratory study focused on university preparation programs in the state of Texas. Students completing principal programs in Texas must pass qualifying exams based on the three domains: School Community Leadership, Instructional Leadership, and Administrative

Leadership (*TExES principal preparation manual,* 2015). The qualifying exam for school principal certification in Texas is composed of nine competencies as shown in Table 1.

Table 1

Competencies and Descriptive Statements for School Principal Certification in Texas

Competency	Descriptive Statement
Competency 001	The principal knows how to shape campus culture by facilitating the development, articulation, implementation and stewardship of a vision of learning that is shared and supported by the school community.
Competency 002	The principal knows how to communicate and collaborate with all members of the school community, respond to diverse interests and needs and mobilize resources to promote student success.
Competency 003	The principal knows how to act with integrity, fairness and in an ethical and legal manner.
Competency 004	The principal knows how to facilitate the design and implementation of curricula and strategic plans that enhance teaching and learning; ensure alignment of curriculum, instruction, resources and assessment; and promote the use of varied assessments to measure student performance.
Competency 005	The principal knows how to advocate, nurture and sustain an instructional program and a campus culture that are conducive to student learning and staff professional growth.
Competency 006	The principal knows how to implement a staff evaluation and development system to improve the performance of all staff members, select and implement appropriate models for supervision and staff development and apply the legal requirements for personnel management.
Competency 007	The principal knows how to apply organizational, decision-making and problem-solving skills to ensure an effective learning environment.
Competency 008	The principal knows how to apply principles of effective leadership and management in relation to campus budgeting, personnel, resource utilization, financial management and technology use.
Competency 009	The principal knows how to apply principles of leadership and management to the campus physical plant and support systems to ensure a safe and effective learning environment

Retrieved from ISTE Standards For Administrators. (2009). Iste.org. Retrieved 29 January 2017, from http://www.iste.org/standards/standards/standards-for-administrators.

Texas principal competencies contradict Schrum, Galizio, and Ledesma's argument that technology leadership components are minimally addressed in principal preparation programs.

Competencies 8 and 9 of the Texas principal certification exam directly reference technology leadership components. Additionally, four subsections of the competencies reference technology leadership components. The complete list of domains, standards, competencies, and descriptive statements can be found in Appendix A. Competency 2, descriptive statement E, states "Develop and implement a comprehensive program of community relations that effectively involves and informs multiple constituencies, including the media" (p. 7). Competency 3, descriptive statement E states "Facilitate the use of technology, telecommunications and information systems to enrich the campus curriculum" (p. 8). Competency 5, descriptive statement F, also relates to technology use and states "Facilitate the use and integration of technology, telecommunications and information systems to enhance learning" (p. 9). Competency 9, descriptive statement F, states "Develop and implement plans for using technology and information systems to enhance school management" (p. 11). In order for a principal preparation program in Texas to be accredited, Texas Education Agency examines programmatic and course information to ensure all domains are met (State Board of Education, 2016). For that reason, every accredited principal preparation program in Texas should possess, at a minimum, the above-mentioned aspects of technology leadership components. However, little research has been done regarding Texas principal preparation programs to determine if universities are addressing just the minimum requirements in technology leadership or are expanding beyond basic requirements to produce graduates who can become technology leaders as principals.

Purpose of the Study

The purpose of the study was to explore the presence of technology leadership components in principal preparation programs among universities in the state of Texas. Although

required to meet the minimum standards of technology leadership as stated in the Texas Education Agency Administrator Standards (2017), universities competing for students strive to create relevant programs that exceed minimal requirements to truly prepare future principals. As universities contend for students in an increasingly competitive educational market, principal preparation programs must go beyond the state minimums in the area of technology leadership (Bradford, Jon, Noland, & Owens, 2007). A resource for Texas universities to utilize as a guide is the International Society for Technology in Education Administrator Standards (Wells et al., 2001). Consisting of five domains specifically addressing technology leadership, this resource was the result of a collaboration between many organizations such as the American Association of School Administrators, National School Board Association, Association of Educational Service Agencies, and International Society for Technology in Education. The six domains of technology leadership which include leadership and vision, learning and teaching, productivity and professional practice, support management and operations, and social, legal, and ethical issues were utilized as technology leadership categories for the research.

In addition to exploring the presence of technology leadership instruction, an inquiry into possible differences among face-to-face, online, and blended principal preparation programs was conducted. The increasing enrollment of students in online principal preparation programs creates opportunities for students to choose which type of program best fits their needs. The body of literature indicates more research is needed to compare programs by delivery type.

Overview of Dissertation

The second chapter of the study includes relevant literature related to technology leadership and how it is being addressed in universities offering principal preparation programs.

The literature indicated that recently graduated and newly serving principals report feeling underprepared by their universities in the area of technology leadership instruction (Duncan, 2011; Hayashi & Fisher-Adams, 2015; Yu & Prince, 2016). Additionally, a gap in the current body of literature regarding the comparison of online, face-to-face, and blended principal preparation programs was discovered. The literature review in Chapter 2 frames the need for further studies exploring technology leadership preparation among Texas university principal preparation programs as well as examining possible similarities and differences based on the program being delivered online, face-to-face, or blended.

The third chapter includes the methodology for this study. The data gathering and statistical analysis processes on the focused principal preparation programs was discussed to increase transparency. Chapter 4 presents the results of the research of this exploratory study. Chapter 5 offers the reader a discussion of the results and suggestions for future research.

Definition of Terms

The delivery methods utilized in the present study were blended, face-to-face, online, and multiple program delivery. While an operational definition based on the body of literature was offered, it should be noted that when categorizing courses, the category of the university was used as described in course catalogs.

- *Blended.* A learning program in which 50% of the instruction is given online with some element of student control over degree such as time, place, and pace while at least 50% of instruction is given at a supervised physical brick and mortar location away from home (Horn & Staker, 2014).
- *Face-to-face*. The traditional classroom or face-to-face instruction is when the

instructor and the students of an educational institution are in a physical place devoted to instruction and the teaching and learning take place at the same time. In face-to-face programs, 100% of instruction is given at the physical location (Horn & Staker, 2014).

- *Multiple program delivery.* A learning program offered by a university in multiple delivery platforms. To qualify for this category, programs are offered 100% online, 100% face-to-face, and 100% blended in which students receive 50% of instruction takes place online and 50% of instruction takes place in a physical location (Horn & Staker, 2014).

- *Online*. A method of instruction via a technology-based learning platform in which students acquire information and complete courses 100% remotely instead of physically attending brick and mortar learning institutions (Horn & Staker, 2014).

- *Principal*. The educator who has an executive authority for a school. For the purpose of the study, the term principal will mean the acting head of a K-12 campus (School principal – Dictionary definition, 2017).

- *Principal preparation program*. For the purposes of the study, the phrase principal preparation program refers to universities offering a master degree in education administration that includes the option of principal certification. Because the study took take place in Texas, it is important to note the minimal requirements for receiving a principal certification in the state. Specifically, to be awarded a principal certificate, a student must have a master degree in education or related field, have at least two years of classroom teaching experience, complete a principal certification program, and successfully pass the state principal certification exam required by Texas Education Agency (2015).

- *Technology leadership*. A term found in the field of educational leadership, it has become a topic for study, in tandem with the pedagogical change of integrating ICT in teaching

and learning especially in the developed nations (Mwawasi, 2014). For the purpose of the present study, technology leadership will mean the practices and policies of an executive position (K-12 school principal) as it relates to implementation and management of technology on the campus for both instructional methods and day to day management (Rouse, 2015).

The study should contribute to learning technologies literature in that it could help universities gain a deeper understanding of the importance of addressing technology leadership in their principal preparation programs. This chapter provided the reader with an abbreviated purpose, operational definitions, and methodology overview of the study. The next chapter identifies themes found in the literature that support the need for the study.

CHAPTER 2

LITERATURE REVIEW

Introduction

In public schools, principals have the complex task of incorporating technologies that have research-based support showing they enhance learning and increase the efficiency of daily operations (Metcalf & LaFrance, 2013). They also have the responsibility of implementing school technology plans that align with district and state policies while addressing campus needs (Duncan, 2011). Although there are many important components to using technology well in school systems, technology leadership is a crucial factor when using technology to improve student achievement (Anderson & Dexter, 2005; Machado & Chung, 2015). Leonard and Leonard (2006) argued "the quality of technology integration in our schools is likely to be determined by the caliber of leadership to sustain it" (p. 223). Whitehead, Jensen, and Boschee (2013) add that poor technology leadership will result in frustrated teachers and students, decreased learning, and increased cost to tax-payers. Although the principals can move technology forward in their schools, some research suggests recently graduated principals do not feel prepared to implement and incorporate technology (Duncan, 2011; Hayashi & Fisher-Adams, 2015; Yu & Prince, 2016).

A Gap in Technology Leadership Preparation

Metcalf and LaFrance (2013) published survey research that indicated principals felt most prepared with using basic technology tools, such as Microsoft Office suite applications and Google tools, but least prepared with visionary leadership. The Metcalf and LaFrance study, containing a sample population of 208 school administrators in the state of Virginia, examined

principals' perceptions of their own preparation to implement school technology. The authors reported this sample to contain 10.4 % of public school administrators in Virginia. Questions posed in this research study were based on the formerly National Educational Technology Standards for Administrators (NETS-A) six domains of technology leadership now known as International Society for Technology in Education (ISTE) Standards for Administrators. This is relevant because the study in this dissertation employ the same ISTE Standards for Administrators (ISTE, 2009). The recommendation of the Metcalf and LaFrance (2013) study encouraged school districts to provide principals professional development in technology leadership. Moorehead, Schuler and Yokley (2015), in a survey of secondary principals in Missouri, reported a majority of principals felt their universities did not prepare them for technology leadership and sought professional development in this area during their first year of employment.

Providing professional development to address the gap in technology leadership instruction to those already in principal positions is an individual school district decision. Therefore, finding that there is a need for additional training in this area upon completing the principal certification program suggests there is a gap in principal preparation programs in the area of technology leadership. Because technology evolves at a rapid rate and those recently graduating from such principal preparation programs who have grown up with the newest technologies should, in theory, have stronger technology leadership preparation than those graduating earlier. (Hayaski & Fisher-Adams, 2015). However, the current body of literature suggests that recent graduates of principal preparation programs reported feeling unprepared in technology leadership.

Research by Hayaski and Fisher-Adams (2015) examined 275 graduates receiving Master

Degrees' in Educational Administration as part of their principal preparation programs between the 2007 and 2011. The study used the NETS-A standards, as did the Metcalf and La France (2013) study, for the foundation of survey questions. Participants showed a desire for additional instruction regarding technology throughout all of their university courses. Participants reported variation in instruction regarding technology including legal issues such as cyberbullying, and fourth amendment search and seizure issues regarding school administrator rights to examine data kept on students' personal electronic devices. The study used the NETS-A standards (now called ISTE standards), as did Metcalf and LaFrance (2013), for the foundation of survey questions. Hayaski and Fisher-Adams (2015) reported while recent graduates expressed feeling more prepared in technology leadership, a need for additional training in this area still existed.

Acker (2015) completed a study focused on school principal perceptions regarding their ability to identify technologically-competent teachers during the hiring process. Acker's research indicated all interviewed participants shared a belief that it is important to hire technology-competent teachers. The literature review in this area further revealed that not only were recent graduates were dissatisfied with technology leadership preparation in principal preparation programs, but their superintendents were also unhappy with newly hired principals as well. Superville (2017) reported that 80% of superintendents surveyed nationally expressed a dissatisfaction with the overall quality of principals they were receiving from universities. DeArmond and Campbell (2014) found similar results in a study of 215 superintendents in the state of Washington. With technology changing the face of education, superintendents in this study expressed a shortage of "game-changing principals" (p.3).

Universities – Training Grounds for Tomorrows' Technology Leaders

A commonality among Hayaski and Fisher-Adams (2015), Metcalf and LaFrance (2013), and Superville (2017) studies was the suggestion that universities with principal preparation programs should expand training beyond basic technology tools and move into offering courses supporting technology leadership. Young and Brewer (2008) reinforced this argument, stating that "schools rely on university principal preparation programs to train and develop the next generation of school leaders, indeed, the responsibility for leadership preparation falls squarely on the shoulders of higher education" (p. 106). During a collaboration to create the *Technology Standards of School Administrators* Dr. Don Knezek commented, "We have a wealth of evidence attesting to the importance of leadership in implementing and sustaining systemic reform in schools. It is critical, therefore, that we attend seriously to leadership for technology in schools" (Wells et al., 2001, p. 5).

Challenges for Universities

Universities face many challenges when attending to technology leadership in principal preparation programs. Difficulties discovered in the literature include professional development deficits for professors regarding technology leadership, school districts with varying priorities depending on size and location, and the ever-increasing rate of technology evolution (Superville, 2017). Further, there are various state requirements regarding technology leadership for principal certification, and shifts from traditional to online and blended delivery platforms that create issues for institutions (Duncan, 2011; Hayaski & Fisher-Adams, 2015; Wells et all, 2009). One particular challenge universities face is balancing the competition for students enrolling in principal preparation programs with the quality of education being offered (e.g. amount of

courses, type of instruction, and relevance) (Superville, 2017). It is therefore important to understand challenges universities face as they prepare future principals to lead in a wide variety of roles and duties. McLeod, Bathon, and Richardson (2011) stated, "Our professional priorities must be aimed at preparing our programs' graduates for the world as it is and as it will be. Who's going to prepare these school leaders if we don't?" (p.4).

Professional Development Deficits for Professors in the Area of Technology Leadership

Professional development in technology leadership instruction would help professors teaching principal preparation courses (Nicholls, 2001). Nash (2011) argued there exists an increasing pressure within higher education faculty to teach online courses and that the "professor who is successful in a face-to-face course is not guaranteed to be so online" (p. 182). Nash continues that professors instructing online principal preparation courses who struggle teaching via technology will also have deficits teaching technology leadership components. The current body of literature, however, shows little consistency of professional development expectations among universities (Hayashi and Fisher-Adams, 2015; Nash, 2011; Nicholls, 2001).

Hayashi and Fisher-Adams (2015) noted that professors' personal use of technology to teach the course was often based on self-determination and not part of required coursework (2015). Nash (2011) also discovered professors who teach online spend an average of 16% more time preparing and teaching than an instructor in the same on-campus course (2011). Nicholls (2001) added that many universities see professors as subject matter experts and value publication status over teaching abilities. Nicholls continued that the emphasis of publication status over teaching ability creates an imbalance of focus regarding professional development for professors. Garrison and Vaughan (2013) argued that increasing class sizes and student reports of

dissatisfaction with instruction are cause for universities to pay more attention to professional development (2013). The authors added that the shift of instruction to blended and online environments, coupled with the increasing choices of educational institutions require that universities focus on professional development to improve teaching and learning outcome.

Varying Roles of Principals in Technology Leadership

Varying principal roles and responsibilities regarding technology leadership increase the difficulty for universities trying to address the subject in coursework. Cavanaugh (2016) reported, in a study of educational companies working with K-12 school districts on the frustration consultants experience when trying to discover what roles principals, technology directors, and other leaders play in technology leadership. The variation and degree of decision making regarding education technology vastly differs from school district to school district and the role of the principal in this process fluctuates as well (Cavanaugh, 2016).

Whitehead, Jensen, and Boschee (2013) suggest the principals' role in technology leadership is complex and evolves. To describe some of the roles and responsibilities, the authors stated

> Educational leaders in the 21st century are to set direction and build trust; reshape the conditions for teachers and learning, restructure parts of the organization and redesign leadership roles and responsibilities, nourish the curriculum, enhance teacher quality, enhance the quality of teaching and learning, build collaboration internally, and build strong relationships outside the school community (p. 21).

McLeod, Bathon, and Richardson (2011) argued there was not enough research to determine what technology leadership looks like to adequately address it in leadership preparation programs. Duncan (2011) added that a lack of research of the role of principal in educational technology leadership prevents an accurate assessment of what should be taught.

McLeod et al (2011) continued, saying “outlets for most research studies in technology leadership are limited to conference proceedings, dissertations, and unpublished literature” and the “field of education leadership must do a better job of preparing future leaders in technology leadership” (p. 144). In this study, technology leadership was determined utilizing the International Society for Technology in Education Administrator Standards (ISTE Standards for Administrators, 2009).

Variation in Requirements among States

Schrum, Galizio, and Ledesma (2011) reported that most states do not require formal instruction in the area of technology leadership during principal preparation programs. Superville (2017) argued states should be more assertive in assuring their future principals are prepared for the complex tasks expected of principals regarding technology. After analyzing principal and superintendent requirements in all 50 states, Davis reported that requirements and regulations differed vastly in terms of technology leadership development (2010).

The present study took place in Texas; therefore, an examination of principal certification criteria in the area of technology leadership should be discussed. According to the Texas Educations Association (TEA), for an applicant to be eligible to receive the principal certification he or she must hold a master degree recognized from an accredited university, have at least two years of teaching experience, successfully complete an approved principal preparation program, and pass the required exam (Becoming a Superintendent or Principal in Texas, 2017). The principal certificate standards, as outlined in the Texas Administration Code Chapter 241, are the basis of the principal certification exam (State Board of Education, 2016) and the standards consist of six domains: School Culture, Leading Learning, Human Capital,

Executive Leadership, Strategic Operations, and Ethics (RULE 241.15). Of these six domains, only two have criteria pertaining to technology. The domain Leading Learning includes the statement that a principal should "facilitate the use and integration of technology, telecommunications, and information systems that enhance learning" (C11). Additionally, the domain titled Strategic Operations states that a principal should "use technology to enhance school management" (F9). The few criteria regarding technology leadership in principal preparation programs align with the claim of Schrum, Galizio, and Ledesma that states do not require substantial instruction in this area (2011).

Although Texas has what some might consider minimal requirements regarding technology leadership, there are resources available to help universities develop principal preparation programs rich in technology leadership. A collaborative project in 2001 that included the National Association of Secondary School Principals, National Association of Elementary School Principals, American Association of School Administrators, National School Board Association, the North Central Educational Laboratory (NCREL), the International Society for Technology in Education (ISTE), two state departments of education, two universities, and other interested parties came together to support the idea that principals need specific skills and knowledge to successfully lead in 21st century education (Schrum, Galizio, and Ledesma, 2011). The collaboration offers technology leadership standards for administrators in five domains: Leadership and Vision, Digital Age Learning Culture, Excellence in Professional Practice, Systematic Improvement, Assessment and Digital Citizenship (ISTE Standards for Administrators, 2009). The ISTE Standards for Administrators, formally known as the National Educational Technology Standards (NETS-A) are the basis for the research in this study. Specific criteria for each domain are listed in Table 2.

Table 2

Administrators Technology Standards

Domain	Definition
Visionary leadership	Educational administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization.
Digital age learning culture	Educational Administrators create, promote, and sustain a dynamic, digital-aged learning culture that provides rigorous, relevant, and engaging education for all students.
Excellence in Professional Practice	Excellent Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.
Systemic improvement	Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources
Digital citizenship	Educational Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

ISTE Standards for Administrators. (2009). Iste.org. Retrieved 29 January 2017, from http://www.iste.org/standards/standards/standards-for-administrators

Shift from Traditional Setting to Online and Blended Settings

There is substantial evidence to support that online learning in higher education is now becoming pervasive. The report, *Online Classes vs Traditional Classes – A Comparison,* in 2016 by the University of the Potomac indicated 6.7 million students are enrolled in higher education, 30% of college students are enrolled in at least one online course, and education degrees, including principal preparation programs, are in the top ten most popular online degrees. The Online Learning Consortium reported a slightly lower number of college students enrolled in online classes (5.8 million) in 2016, but reported enrollment in traditional face-to-face courses is in decline (Online classes vs. traditional classes - A learning comparison, 2017). According to a

national survey, 62.4% of U.S. colleges offering a principal certification program provide an online course option (Sheehy, 2013). As universities expand to offer online principal preparation programs to compete for students, courses once offered only in a traditional face-to-face setting are moving to online courses. McLeod and Richardson (2011) argued there is "a significant difference between traditional educational leadership coursework and coursework that puts technology and 21st century skills at its core" (p. 4).

When differentiating between online and face-to-face programs, Delphin (2012) stated the quality of online education should not be less than in traditional settings. His research, based on responses of superintendents, compared general preparation of future principals in face-to-face, blended, and online delivery platforms and showed no significant difference in overall quality. Delphin (2012) argued, however, there is little empirical research comparing online, blended, and traditional principal preparation programs (2012).

Possible Solutions Found in Constructivism and Transformational Leadership

Because technology leadership is rapidly evolving, it is important to discuss theories applicable to technology leadership components. These can aide universities in the development of technology leadership instruction components and ensure program relevance. Constructivism and transformational leadership are both theories that offer suggestions for teaching future students to lead in a changing 21st-century learning environment.

Constructivism

One wing of theoretical constructivism is based on Piaget's theory of learning (1972). Piagetian constructivism describes what knowing is and how one learns. A second conception,

emerging in the 1980s from the work of Soviet thinker Lev Vygotsky (1978) and American theorists such as Duffy and Cunningham (1984) which is more broadly called constructivism, with two main types; radical, in which all truth is in the eye of the learner, and social constructivism, which focuses on knowledge developed through a shared construction process among groups of learners. Fosnot (1996) described constructivist learning as not a static set of truths but "as emergent, developmental, nonobjective, viable constructed explanations humans engaged in meaning making" (p. 10).

Constructivism is in alignment with Whitehead, Jensen, and Boschee's suggestion that principals should have the skillset of collaboration and flexibility (2013). Whitehead, Jensen, and Boschee suggest this skill is the major component of technology planning and implementation (2013). McLeod and Richardson (2011) applied constructivism to technology leadership by stating the constant evolution of technology is cause for future leaders to understand what it means to transform learning environments through collaboration and flexibility.

Elements of constructivism are found in the organizational leadership theory of Bolman and Deal (2013). Considered a seminal theory in educational organizational leadership, Bolman and Deal present four frames, also referred to as organizational lenses, and this theory is taught in a majority of principal preparation program (Hemmen, Edmonson & Slate, 2009). The first frame, structural, refers to rules, regulations, policies, schedules, and other division of labor and coordination of activities to ensure the daily operation of a school moves smoothly. The second frame, human resources, suggests that educational organizations focus on individual needs. As in constructivism, the human resource frame directs leaders to assess the needs of their stakeholders (e.g. students, teachers, staff, and community) through collaboration, flexibility, resulting from a desire to gain a deeper understanding based on the experience of others. The third frame,

political, is the ability to navigate, negotiate, and compromise with educational stakeholders in a way that benefits the school at large over any particular interest group. The fourth frame, symbolic, surrounds the concept of a schools culture and creating a common vision through celebrations, rituals, and other meaningful activities.

Constructivism, Boleman and Deal's (2013) four frames of organizational leadership, and technology leadership were tied together by Richardson, Watts, Hollis and McLeod (2016) when suggesting that school technology span all four areas. The authors also argued technology leadership is present in the structural frame based on the policies of use, physical dissemination of technology, laws, infrastructure, and budgeting decisions. Technology leadership exists in the human resource frame in the form of professional development decisions to address the individual technological needs of an education organization. The political frame touches upon technology leadership when leaders try to gain community support and discuss initiatives such as moving to 1:1 learning environments. The symbolic frame aligns with technology leadership as schools move to enhance learning through educational technologies. As the literature brought forth the theme of superintendents expressing a shortage of "game changers," perhaps principal preparation programs adding elements of technology leadership as defined by the ISTE Administrator Technology standards to the existing schema of Bolman and Deal's frames of educational leadership could fill in the gap of technology leadership skills in future principals (Bolman & Deal, 2013; Denise & Campbell, 2014; Wells et al., 2001).

Transformational Leadership

Transformational leadership was first introduced by Burns in 1978 and focuses on motivation and values (Burns, 1978). Reflecting on his theory in an interview uploaded to

YouTube by the University of Richland in 2010, Burns stated that transformational leadership occurs when “one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality” (Goethals, 2010, 4:03). Such leadership can be compared to reflections shared in the collaboration process which lead to the International Society for Technology in Education (ISTE) Technology Standards for School Administrators. In the same way that Burns (1978) emphasized a leadership focused on motivation and values, ISTE collaborators emphasized motivation and understanding the value technology brings to stakeholders involved in learning (Wells et al., 2001).

Suggestions for Relevance

Superville suggested universities collaborate with school districts to determine what is needed to improve technology leadership skills in future principals (2017). Superville reported that few universities collect data on students after graduation from their principal preparation programs and only an estimated 20% offer mentoring and coaching to new principals after graduation. Professors should stay connected to practicing principals to ensure the principal preparation courses being taught are relevant and current (Hemmen, Edmonson & Slate, 2009). The Center for the Advanced Study of Technology Leadership (CASTLE) is dedicated to the technology needs of school administrators (McLeod, Bathon, Nash, Richardson & Sauers, 2017). CASTLE provides current articles, programs, research, and blogs about the swift-moving area of technology leadership providing universities a free wealth of current information to help keep principal preparation programs current and relevant.

Suggestions for Technology Leadership Resources

As universities work to incorporate technology leadership into their programs and courses, there are resources available to help guide them such as the Center for the Advanced Study of Technology Leadership. In addition, with school district collaboration and feedback from former graduates, universities can use ISTE standards for administrator technology competencies to help develop criteria beyond what their state requires (Wells et al., 2001). The five domains, visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship, were created as a collaborative effort from leaders in technology. ISTE Standards for Administrators offers a brief definition of each domain to help the reader gain a basic operational understanding.

CHAPTER 3

RESEARCH METHODOLOGY

Introduction

The methods of the exploratory study were similar to and build upon work conducted in a previous exploratory study by Shrum, Galizio, and Ledesma (2011). That research analyzed technology leadership requirements among all 50 state licensure departments needed to obtain a principal certification. The authors then identified between two and four of the largest principal preparation programs in each state and examined coursework and program information for presence of technology. Any technology present was noted and then coded using descriptive and thematic coding. The authors stated that "all states except two are not explicitly requiring that administrators demonstrate knowledge of technology use, promotion, or integration in order to earn their initial licensure, however, even these 2 states have vague requirements" (p. 5). Schrum, Galizio, and Ledesma concluded that limited requirements of various states regarding technology leadership was reflected in limited programmatic and course instruction of universities (2011).

The present study extended the research of Shrum, Galizio, and Ledesma (2011), but focused on university principal preparation programs in Texas and their technology leadership a period of six years after the 2011 study to explore if occurrence in technology leadership components in the curriculum is included more. Data collection methods and analysis of programmatic and course information in the study were modeled after the Shrum et al. study, with the exception that the study used predetermined categories for thematic coding. The ISTE Administrator Standards of visionary leadership, digital age learning culture, excellence in professional practice, systemic improvement, and digital citizenship were used as predetermined

categories (ISTE, 2001). A further extension of the Shrum, Galizio, and Ledesma study that was incorporated was the exploration of any differences between online, face-to-face, and blended Texas principal preparation programs. The research questions in the present study are as follows:

1. To what degree do Texas universities address the topic of technology leadership in their principal preparation programs?
2. How do various principal preparation programs in Texas correlate with the International Society for Technology in Education principal standards in the area of technology leadership?
3. Are there differences in the amount of instruction regarding technology leadership among online, face-to-face, and blended programs in Texas?

Data gathered from Texas universities offering principal preparation programs was compared with the Shrum et al. (2011) study to determine if any increase in technology leadership instruction has occurred.

Data Collection

A list of 81 accredited principal preparation programs was identified through the Texas State Board for Educator Certification (SBEC, 2017). Any program discovered to be alternative certifications for those already holding a master's degree was removed from the study. The reason for removing alternative programs was that only a minimum amount of coursework is required to add a principal certification to an existing master degree in varying fields (Texas Education Agency, 2015). In addition to removing alternative certification programs, any programs discovered to be misplaced on the State Board for Educator Certification list of principal preparation programs was removed as well (SPEC, 2017). Information about these programs and individual courses was obtained through online course catalogs. Course descriptions and syllabi information were obtained through university degree plans and syllabi repositories. Additional descriptive information that specifies the program being offered online,

face-to-face, or in blended modes were noted. Programmatic and course information were downloaded and analyzed using simple description and thematic coding for alignment within the International Society for Technology in Education Standards for Administrators (ISTE, 2009). A complete list with sub criteria can be found in Appendix C. The six standards are:

I. Leadership vision – Educational administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support

II. Digital age learning culture – Educational administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.

III. Excellence in professional practice – Educational administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

IV. Systematic improvement – Educational administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

V. Digital citizenship – Educational administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

The analysis of data collected revealed possible presence of technology leadership instruction in Texas principal preparation programs.

Data Analysis

Any principal preparation program identified in the study yielding incomplete program or

course information were discarded but noted in the limitation section. A coding scheme was created that included each of the five technology leadership domains, as well as their sub-criteria as categories. Each principal preparation program was classified as a variable being either online, blended, or face-to-face. This method of quantitative coding employs a set of categories that an observer uses to record frequencies (Fraenkel, Wallen, & Hyun, 2015). The particular coding scheme to be used was developed by Amidon and Hough (1967) and requires data to be placed in predetermined, etic categories. Programmatic and coursework data gathered from the identified principal preparation programs were examined and placed in predetermined categories based on the International Society for Technology in Educations five standards of technology for administrators and their sub categories. Three researchers coded the data and any variance of ratings was discussed until an agreement was reached or a decision to discard could be made. The final portion of the research compared answers between and among principal programs using online, face-to-face, and blended approaches. An analysis of variance (ANOVA) was utilized to determine if there were any significant differences between groups. ANOVA statistics are designed to examine differences when two or more groups exist in a study and is therefore, appropriate for research frequencies (Fraenkel, Wallen, & Hyun, 2015).

Hypothesis Testing from Analyzing Results

Once statistical analysis was completed, the results were used to provide responses to the research questions. For each research question, both a null hypothesis as well as the alternative hypothesis are found below.

1. To what degree are Texas universities addressing the issue of technology leadership in their principal preparation programs?

    H_O: Texas universities are addressing technology leadership in a limited capacity.

This null hypothesis is in alignment with the Shrum, Galizio, and Ledesma (2011) study results that found universities are addressing technology at 4 %.

> H_1: A larger presence of technology leadership instruction among Texas universities exists than was discovered in the Shrum, Galizio, and Ledesma 2011 study.

The authors of the 2011 study reported only eleven technology instances out of the 137 principal preparation programs analyzed (4%). Shrum et al. added that the term data was noted as the most frequent descriptor word in the 2011 study but that a majority of instances were not directly tied to technology.

2. How do various principal preparation programs in Texas correlate with the international principal standards in the area of technology leadership preparation?

   H_O: Program requirements at Texas universities do not correlate with the International Society for Technology in Education administrator standards.

   H_1: Program requirements at Texas universities are showing an increased correlation with the International Society for Technology in Education administrator standards. The null hypothesis is in alignment with Shrum, Galizio, and Ledesma (2011) findings.

3. Are there differences in the amount of instruction regarding technology leadership among online, face-to-face, and blended programs in Texas?

   H_O: There is no difference in the amount of technology leadership instruction between online, face-to-face, and traditional principal preparation programs in Texas.

   H_1: There is a statistically significant difference of technology leadership instruction between online, face-to-face, and blended principal preparation programs in Texas.

Timeline for Completion

The timeline for completion of this study is/was December of 2017. A research proposal was successfully completed in June of 2017 and a minimal IRB (Internal Review Board) was submitted. The IRB was received as exempt and data were collected through September of 2017. The data collection code sheets were created and disseminated to the two fellow doctoral

students who had agreed to code the data. The code sheets were received back on September 20, 2017 and analysis of the data began immediately. Chapter 4 was written by September 25, 2017, and submitted to the doctoral committee on September 27th for editing and revision purposes. Chapter 5 was written by October 19, 2017, and submitted to the doctoral committee for revisions and edits on October 20, 2017. Corrections were completed and a dissertation defense took place on November 3, 2017, at the University of North Texas University campus.

In summary, the present study was modeled after Shrum, Galizio, and Ledesma's 2011 national research that explored the presence of technology leadership instruction in principal preparation programs. Data gathering and analysis were kept as close to the Schrum et al. 2011 study as possible with a distinct extension of focusing on principal preparation programs located in Texas. The International Society for Technology in Education Administrator Standards were used as the criteria and an exploration into possible differences based on delivery method were completed. Results of the analysis and presentation of data in chapter 4 were utilized to answer the three research questioned posed in the present study.

CHAPTER 4

PRESENTATION OF DATA

Introduction

This exploratory study examined the presence of technology leadership components among principal preparation programs in the state of Texas. The purpose was to compare results with a study by Shrum, Galizio, and Ledesma in 2011 to determine if any increase of technology leadership components were discovered. Further exploration compared variations of technology leadership based on delivery method. The following research questions were analyzed.

1. To what degree do Texas universities address the topic of technology leadership in their principal preparation programs?
2. How do various principal preparation programs in Texas correlate with the International Society for Technology in Education principal standards in the area of technology leadership?
3. Are there differences in the amount of instruction regarding technology leadership among online, face-to-face, and blended programs in Texas?

Description of Programs and Course Data

A total of 57 principal preparation programs in Texas were analyzed for this study. Each program was classified as being face-to-face, blended, or online instructional delivery method based on information located on individual program website pages. There was one instance where a Texas university offered some courses face-to-face, others online, and some blended. In this situation, the program was classified based on the majority of instructional delivery method. Seven programs advertised they offer the full degree in both online and face-to-face format. There was no observed difference in programmatic or course information in the seven programs. Although there was no mention of principal preparation programs in Shrum's et al. 2011 study that were offered completely in both online and face-to-face delivery methods, the presence of

seven such programs in the present study caused an additional category to be considered. The category “multiple program delivery” was added to describe the seven programs offered completely in online and face-to-face delivery options. Table three demonstrates both the frequency and overall percentage of the 57 programs analyzed for the purpose of the present study.

Table 3

Program Based on Delivery Method

Program Type	Frequency	Percent
Online	25	43.86%
Face-To-Face	19	33.33%
Multiple	7	12.28%
Blended	6	10.53%
Total	57	100.0%

Texas principal preparation programs offered online comprised the largest portion of overall program delivery method. Of the 57 programs analyzed, those offered completely online comprised of 43.86% and occurred 25 times. The next largest representation, face-to-face delivery, occurred 19 times (33%). Programs offered in multiple methods represented 12.28% and occurred seven times. The smallest representation in overall programs based on delivery method were blended programs which represented 10% and occurred six times.

Information about individual courses was then analyzed for general presence of technology leadership components. A total of 635 courses were evaluated that consisted of 289 online courses, 187 face-to-face courses, 73 blended courses, and 86 courses offered in both online and face-to-face. Courses were categorized by delivery methods stated in online course catalogs. Online courses were advertised to be a method of instruction via a technology-based learning platform in which students acquire information and complete courses 100% remotely

instead of physically attending brick and mortar learning institutions (Horn & Staker, 2014). Courses were classified as being blended when 50% of the instruction is given online with some element of student control over elements such as time, place, and pace while at least 50% of instruction is given at a supervised physical brick and mortar location away from home (Horn & Staker, 2014). Courses were classified as face-to-face instruction when the instructor and the students of an educational institution were in a physical place devoted to instruction and the teaching and learning took place at the same time. In face-to-face programs, 100% of instruction is given at the physical location (Horn & Staker, 2014). Courses were categorized as multiple methods when the course catalog stated the course could be taken as an online or face-to-face course.

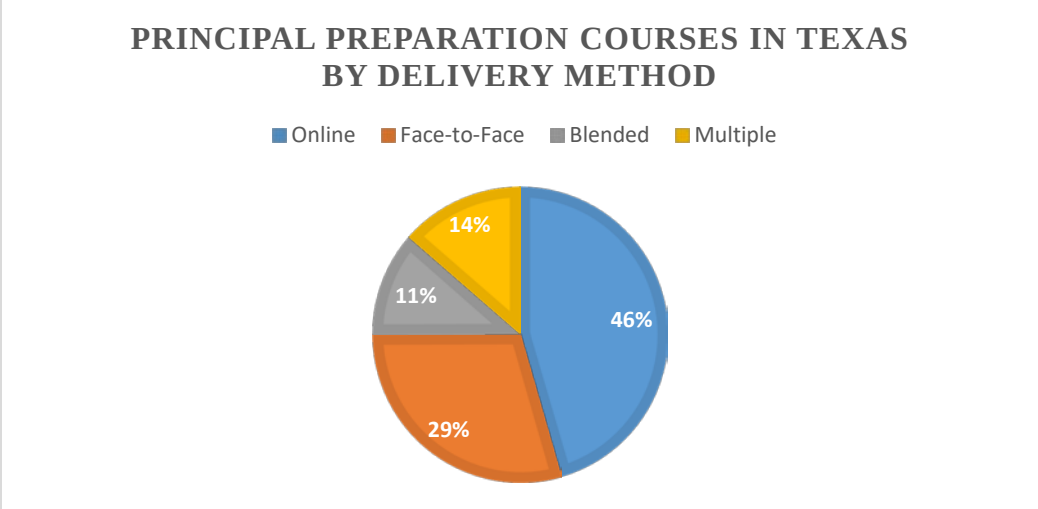


Figure 1. Principal preparation courses in Texas broken down by delivery method.

The number of required courses varied between programs but the average was 11 with a maximum number 16 courses and the minimum of 8. It should be noted, the number of courses does not necessarily reflect the length of the course. Southern Methodist University, for example, offers a 40-credit-hour program broken down into 7 week courses with one beginning as one ends (M.Ed. Accelerated Leadership – SMU, 2017). The projected time to complete Southern

Methodist Universities principal preparation program is 14 months if students take courses year-round. Similarly, University of Houston Clear Lake required a 39 credit-hour program broken down into 8-week sessions and takes an estimated 14 months to complete (www.uhcl.edu, 2017). In contrast, the University of Texas at Austin offers a 30 credit-hour program that is designed to be completed in two years (Program Overview Educational Administration, 2017).

An analysis of presence of technology leadership components was performed. There were 13 courses that contained the phrase technology leadership in the title. Of these courses, five were delivered online, four were face-to-face, and four were offered in multiple delivery methods. There were no blended courses containing technology leadership components in the title. Courses with the phrase technology leadership in the title were automatically added to a code-sheet for further analysis.

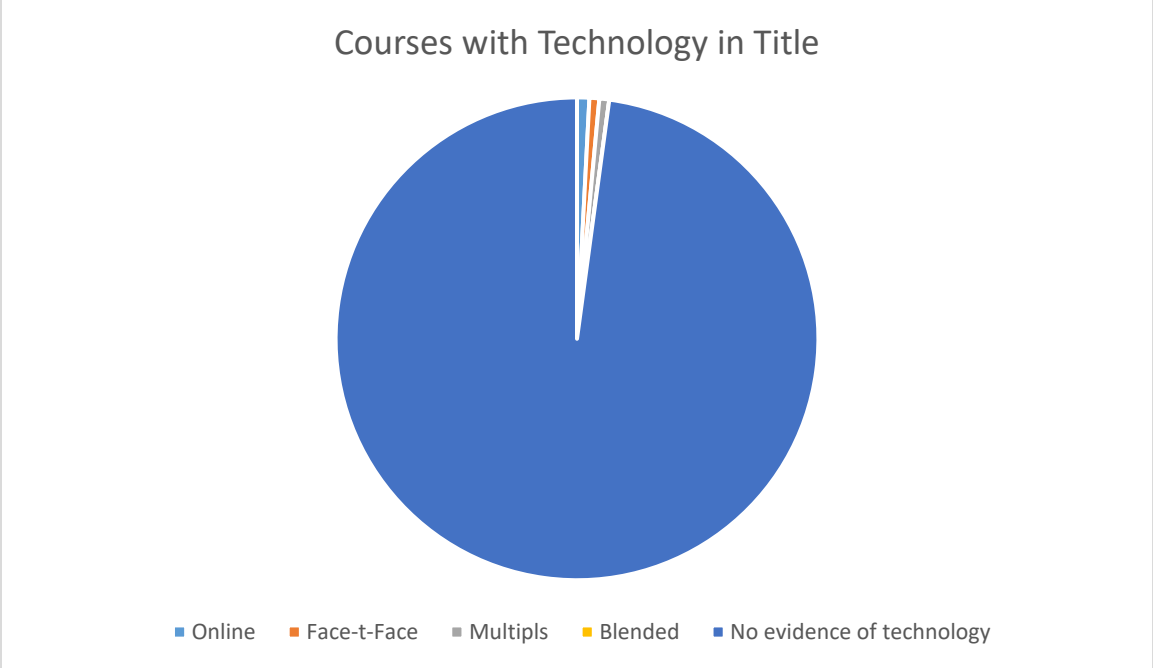


Figure 2. Courses with phrase technology leadership in the title.

The remaining 622 courses were analyzed by examining course descriptions. A search of university syllabi repositories and program websites identified 55 syllabi that were analyzed as

well. This method aligned with Shrum et al. 2011 study that analyzed “syllabi, when available” (p. 246). Words and phrases that were identified in course descriptions and available syllabi as evidence of technology leadership were noted. Courses that contained evidence of technology leadership were added to the code sheet for further analysis.

Table 4

List of Descriptor Words and Phrases and Course Delivery

Descriptor words	Total Frequency	Online	Face-to-Face	Multiple	Blended
Media	5	2	0	3	0
21st century learning	9	4	3	3	1
Information system	1	1	0	0	0
Software application	2	1	0	1	0
Technology communities	1	1	0	0	0
Educational technology	1	0	1	0	0
Technology as resource	4	3	0	0	1
Performance in technology	2	1	1	0	0
Technical education	1	0	0	1	0
Research in literature and technology	1	1	0	0	0
Technology in ed settings	1	0	0	1	0
Technology learning outcomes	3	1	1	1	0
Technology leadership	2	1	0	1	0
Evolving technology	3	0	3	0	0
Technological environments	1	0	1	0	0
Computer mediated curriculum	1	0	1	0	0
E-portfolio	1	1	0	0	0
Technology assistive tools	3	0	3	0	0
Web communication	1	0	1	0	0
Use of microcomputers	1	0	1	0	0

(table continues)

Descriptor words	Total Frequency	Online	Face-to-Face	Multiple	Blended
ISTE admin standards	1	1	0	0	0
Technology integration	1	1	0	0	0

Although some phrases may be considered to be similar enough to combine, for transparency purposes, descriptor words and phrases with any differences were represented as a separate entry in table 4. The phrase *21st century learning* had the largest number of frequencies at nine times when other phrases were found between one and three times. The phrase *21st century learning* was discovered in online courses twice as much (four times) as in face-to-face courses and multiple delivery courses (two times) and only once in blended courses. The term *media* had the second largest representation with a frequency of five. The term media, however, presented more in multiple delivery method courses (three times) than in online courses (twice). The phrase *technology as a resource* was the third most mentioned phrase that presented a total of four times. Three of the frequencies for this phrase were discovered in online courses and once in blended courses.

Code Sheet Results

The code sheet containing 43 courses was shared and completed by three raters. University names as well as delivery method were left off to limit any potential bias. Each course was listed by title, description of the class as listed in the course catalog, and any phrase from a syllabus that indicated possible presence of technology leadership components as recommended by the International Society of Technology in Education (ISTE) Administrator Standards. The code sheet contained categories for each rater to decide which standards the descriptor words or phrases would best fit into. The full code sheet can be found in its entirety in Appendix D.

An initial discussion by the raters over differences and similarities between the categories systemic improvement and digital citizenship took place. One rater expressed the belief that the phrase “ensuring equitable access to technology” should belong under systemic improvement instead of digital citizenship. The discussion lead to a conversation amongst raters how the categories fit within a public school environment. The conversation was beneficial in that it gave the raters an operational definition and similar context from which to work. Consensus was reached by the raters and the results indicated some categories seemed to be represented more than others. For example, courses listed elements similar to the Digital Age Learning Culture Standard presented twice as much as courses that listed elements of Excellence in Professional Practice.

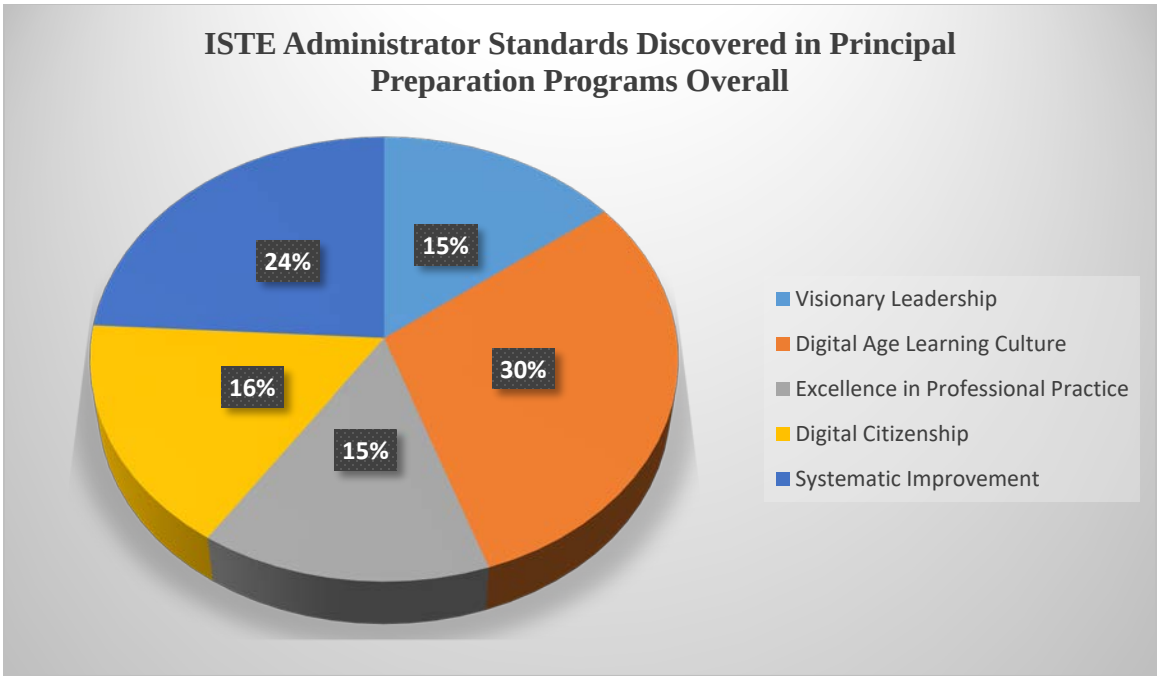


Figure 3. ISTE administrator standards represented in principal preparation programs.

Figure 3 demonstrates simple percentage representation of each ISTE administrator standard regardless of delivery method. The largest representation was found in the domain digital age learning culture at 30%. The domain systematic improvement was the second largest

represented at 24%. The domain digital citizenship was represented at 16% overall. Domains visionary leadership, and excellence in professional practice were less represented at 15% each. Possible reasons for this finding are discussed in Chapter 5.

Differences of Technology Leadership Components by Delivery Method

Table 5

ANOVA Results Utilizing Descriptor Words and Instruction Delivery Methods

Summary of Data

	Treatments					
	1	2	3	4	5	Total
N	22	22	22	22		88
ΣX	18	15	10	2		45
Mean	0.8182	0.6818	0.4545	0.0909		0.5114
ΣX^2	38	29	18	2		87
Std.Dev.	1.0527	0.9455	0.8004	0.2942		0.8576

Result Details

Source	***SS***	***df***	***MS***	
Between-treatments	6.6705	3	2.2235	*F* = 3.25853
Within-treatments	57.3182	84	0.6824	
Total	63.9886	87		

The f- ration value is 3.25853 and the *p*-value is .025538. The result is significant at $p < .05$.

In an effort to explore differences of technology leadership components by delivery method, a one-way ANOVA was performed. Utilizing presence of descriptor words by delivery

method from Table 4, categories (treatments) were online courses (Treatment 1), face-to-face (Treatment 2), blended (Treatment 3), and multiple methods (Treatment 4). The results showed statistically significant presence of technology leadership components in courses delivered online over other methods. The F-ratio value was determined to be 3.25853, the *p*-value was .025538 which presented a significant result at $p < 05$.

Table 5 is represented with 3 degrees of freedom consisting of the 4 delivery methods online, face-to-face, blended, and multiple program delivery. The f-ration value of 3.25853 revealed that there is a significantly significant difference between the representations of descriptor words in one or more delivery category. The low p-value of .025538 fell below the standard .05 alpha level which showed data results would have occurred by chance at most 3% of the time.

Research Question 1

Research Question 1 asked, "To what degree do Texas universities address the topic of technology leadership in their principal preparation programs?" The research null hypothesis stated Texas universities are addressing technology leadership in a limited capacity. This position was in alignment with the Shrum, Galizio, and Ledesma (2011) study results that found universities are addressing technology minimally at 4%.

The analysis of 635 courses, which comprised the 57 principal preparation programs utilized in the present study, yielded 43 courses with technology leadership components in either the title, course description, or available syllabi. Simple percentage calculations presented the overall representation to be 6.8%. When compared to the Shrum et al. (2011) study that stated the national average to be 4%, a minimal increase is noted. Although the increase was small in

percentage, it is important to note that, during the Shrum et al. 2011 study, Texas did not require technology as a component in principal certification programs. During the present study conducted in 2017, components related to technology leadership were found. The Texas principal certification exam's Competencies 8 and 9 directly reference technology leadership components (see Table 1). Additionally, four subsections of the competencies reference technology leadership components.

Research Question 2

Research Question 2 asked, "How do various principal preparation programs in Texas correlate with the international principal standards in the area of technology leadership preparation?" The research null hypothesis stated Texas universities do not correlate with the International Society for Technology in Education administrator standards. This hypothesis is in alignment with the Shrum et al. 2011 study that found technology leadership is minimally represented at 4% in principal preparation programs across the nation. Shrum et al. study found Michigan and New Mexico were the only two states that had required technology leadership components (2011). Texas was not noted in the 2011 study as having presence of technology leadership components. The null hypothesis stated "Texas universities are showing an increased correlation with the International Society for Technology in Education administrator standards". To compare Texas with Shrum et al. 2011, two pieces of evidence were presented.

When the Texas Principal Competencies for Administrator Certification were examined during the time of the present study, technology leadership components were discovered (Texas Educators Association, 2017). The domain Leading Learning includes the statement a principal should "facilitate the use and integration of technology, telecommunications, and information

systems that enhance learning" (C11). Additionally, the domain titled Strategic Operations states that a principal should "use technology to enhance school management (F9). Due to the lack of technology leadership components in 2011 by Texas universities, any presence of such components in 2017 demonstrate an in increased presence of technology leadership components.

Further analysis indicated that technology leadership components in Texas principal preparation programs, though minimal, are showing evidence of aligning with the International Society for Technology in Education administrator standards. The code sheet, completed by three raters, were able to align technology descriptor words with the standards. As shown in figure 3, some standards are represented to a larger degree than others. The standard Digital Age Culture was represented at 30% followed by Systemic Improvement at 24%. The three remaining standards were significantly less represented as Digital Age Citizenship presented 16%, Excellence in Professional Practice at 15%, and Visionary Leadership at 15%. Possible reasons for differences of representation between the International Society for Technology in Education administrator standards are discussed in chapter 5.

Research Question 3

Research Question 3 asked "Are there differences in the amount of instruction regarding technology leadership among online, face-to-face, and blended programs in Texas?" The null hypothesis of the study stated there would be no difference in the amount of technology leadership instruction between online, face-to-face, and traditional principal preparation programs in Texas. The hypothesis of the study stated there would be a statistically significant difference of technology leadership instruction between online, face-to-face, blended, and multiple delivery method principal preparation programs in Texas.

Using one-way ANOVA calculations, each standard represented in the International Society for Technology in Education was analyzed to determine possible differences among instruction delivery type. The standards are Visionary Leadership, Digital Age Learning Culture, Excellence in Professional Practice, Systemic Improvement, and Digital Citizenship. Delivery methods used were online, face-to-face, blended, and multiple delivery program. Tables 6 demonstrate results for each standard.

Table 6

Frequency of ISTE Administrator Standards by Delivery Method

	online	**f2f**	**blended**	**multiple**
Visionary Leadership	5	2	0	3
Digital Age Learning Culture	9	5	0	5
Excellence in Professional Practice	8	1	0	2
Systemic Improvement	7	2	1	6
Digital Citizenship	3	6	1	1
n	5	5	5	5
X	6.400	3.200	0.400	3.400
s	2.408	2.168	0.548	2.074
$\mathbf{X}_{ave}$	3.350			

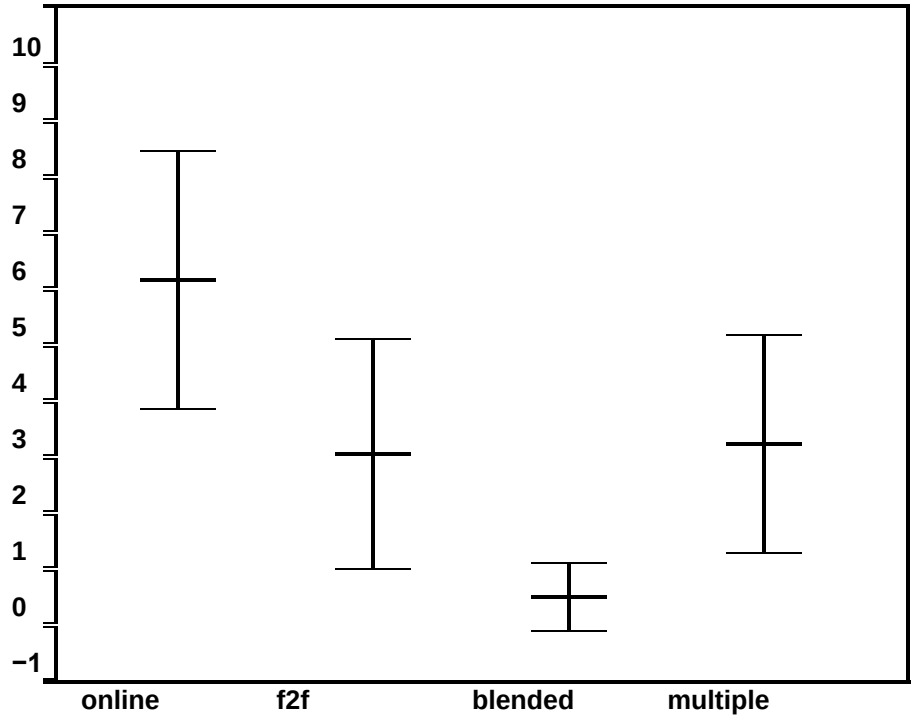
source	**df**	**SS**	**MS**	**F**	**P-value**
treatments	3	90.150	30.050	7.9603	0.0018
error	16	60.400	3.775		
total	19	150.550			

The degrees of freedom for this calculation was 3 and represented the four delivery categories of online, face-to-face, blended, and multiple. The F-value is computed from the data and represents how much the variability among the means exceeds that expected due to chance.

In table 6, the F-value of 7.9603 shows that there was significant difference between at least of the categories. The P-value of 0.0018 was less than the .05 alpha level of probable error and resulted in the decision that statistically significant differences were found in presence of technology leadership instruction based on delivery method. A Box and Whiskers Plot, as seen in table 7, gave a visual representation of the data distribution of each standard based on delivery method.

Table 7

Distribution of ISTE Administrator Standards by Delivery Method



The box and whiskers plot showed the range of the data as well as the median of occurrences based on delivery method. Online delivery method demonstrated the largest occurrence on ISTE administrator standards ranging from 8.5 to 4.0 instances with a median representation of 6. Face-to-face delivery method occurrences ranged from 5.0 to 1.0 with a median frequency of 3. Blended delivery method presented the lowest presence of ISTE

Administrator Standards with the highest instance being 1.0, the lowest instant being 0.0 and the median instance being .5. Multiple method delivery courses represented very similar to face-to-face courses in ISTE administrator standard representation with the range of occurrences being 5.0 to 1.0 and a median of 3.0 instances.

The data in the present study showed a limited overall presence of technology leadership instruction based on the ISTE Administrator Standards in Texas principal preparation programs. Further analysis of courses in which presence of technology leadership instruction was discovered showed differences based on delivery method. The ANOVA calculations and Box and Whickers chart demonstrated a statistically higher occurrence of technology leadership instruction based on the ISTE Administrator Standards in courses taught in online environments. Discussion of possible reasons and recommendations of the results are discussed in chapter 5.

In summary, the research showed a limited 6.8% presence of technology leadership instruction in Texas principal preparation programs. Of the discovered presence, a significantly larger presence of technology leadership instruction was found in courses delivered online. An analysis of ISTE administrator domains revealed that some domains are represented more than other domains. Possible reasons, discussions, and suggestions are found in chapter 5 of the present study.

CHAPTER 5

DISCUSSION AND RECCOMENDATIONS

Introduction

During a collaboration to create the *Technology Standards of School Administrators* Dr. Don Knezek commented, “We have a wealth of evidence attesting to the importance of leadership in implementing and sustaining systemic reform in schools. It is critical, therefore, that we attend seriously to leadership for technology in schools” (Wells et al., 2001, p. 5). This study adds to the limited research which compares the presence of technology leadership components in Texas principal preparation programs to a similar study done on a national level by Shrum et al. in 2011. Results from this study indicate that a slight increase the presence of technology leadership components from 4% in the 2011 study to 6.8% in 2017. In addition, this study provides insight to the need for an increase of technology leadership instruction in Texas university preparation programs, how the International Society for Technology in Education 2017 Administrator Competencies are currently being represented, and possible suggestions for future growth in this field.

Dr. Sanee Bell, keynote speaker at the October 2017 Texas Elementary Principals and Supervisors Association and elementary principal of the year for Katy ISD, spoke of the profound need for professional development and training for principals to effectively lead in 21st century environments (Bell, 2017). The International Society for Technology in Education Administrator Competencies provides a strong resource and guide in this area (ISTE, 2014). The present study gives universities competing for future students and education technology companies competing for business a deeper understanding of which technology leadership

components are being taught in university principal preparation programs and which components are areas of growth.

Discussion of Findings

This study examined the presence of technology leadership components in Texas principal preparation programs as compared to a previous study completed by Shrum et al. in 2011. The following research questions were investigated by the study:

> Research Question 1: To what degree are Texas universities addressing the issue of technology leadership in their principal preparation programs?

As discussed in chapter 4 of the present study, an overall representation of 47 out of 635 analyzed showed evidence of presence of technology leadership components. The purpose of this study was to compare results with the 2011 Schrum et al. study in which technology leadership components were represented nationally at 4%. It must be noted for discussion that during the time of the 2011 study, the state of Texas did not specifically have requirement for principal certification that directly mandated demonstration of technological leadership proficiency to obtain a principal certification. At the time of the present study in 2017, Texas has added components to its principal requisites (See Table 1). Although representation of technology leadership components has increase by 7%, this may be a major factor in that increase.

The minimal amount of technology leadership components in principal preparation programs discovered in the present study does not proportionately reflect the principal certificate standards, as outlined in the Texas Administration Code Chapter 241, which include two domains pertaining to technology leadership components (State Board of Education, 2016). The domain *Leading Learning* includes the statement that a principal should "facilitate the use and integration of technology, telecommunications, and information systems that enhance learning"

(C11). Additionally, the domain *Strategic Operations* states that a principal should "use technology to enhance school management (F9).

One possible reason for this misalignment is found in the monitoring of curriculum by the Texas Higher Education Coordinating Board. Programs that include a licensure, such as nursing, teaching, or principal are not monitored by an outside agency or organization unless hours are added (Texas Higher Education Coordinating Board, 2017). Maintenance of curriculum alignment with current standards are the responsibility of individual institutions. It is anticipated that the pass/fail rate of students from individual principal licensure programs are a driving factor for internal changes to curriculum.

> Research Question 2: How do various principal preparation programs in Texas correlate with the international principal standards in the area of technology leadership preparation?

Based on course descriptions and available syllabi, the raters were able to assign individual courses into different categories of technology leadership based on the International Society of Technology for Education Competencies for Administrators. This shows possible evidence of attention and alignment with the competencies. The results from each standard is discussed in the following paragraphs.

The present study revealed the International Society for Technology in Education Administrator Competencies *Visionary Leadership* and *Professional Practices* are the least represented domains, each presenting at 15% of the 43 courses identified as having technology leadership components. Visionary Leadership was defined by ISTE collaborators as Educational administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support transformation throughout the organization (ISTE Standards for Administrators, 2009). The domain Professional Practices as defined by ISTE collaborators as promote an environment of professional learning

and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

Metcalf and LaFrance (2013) published survey research that indicated principals felt most prepared with using basic technology tools, such as Microsoft Office suite applications and Google tools, but least prepared with *Visionary Leadership*. Dr. Bell further argued that the need for instruction on how principals create visions for their individual campuses is profound (Bell, 2017). The results from this study show a strong need for improvement in the administrator competency *Visionary Leadership* in principal preparation programs.

The administrator competency *Professional Practice* directs principals to provide continuous training and support to teachers, and that a progressive administrator must stay abreast of educational research and emerging trends in the effective use of technology (Crompton, 2015). One possible reason that universities minimally represent this domain is the rapid and continuously evolving field (Whitehead, Jensen, and Boschee, 2013). Universities offering principal preparation programs may be unable to update their curriculum regarding the domain of *Professional Practice* as quickly as it is progressing.

The competency *Digital Age Learning Culture* was represented more than any of the other domains at 30%. This domain is defined by ISTE as educational administrators create, promote, and sustain a dynamic, digital-aged learning culture that provides rigorous, relevant, and engaging education for all students (2009).

One possible reason this competency is represented at almost twice as much as the others lies in how the International Society for Technology in Education recommends to implement this domain. Recommendations include providing professional development on how to use the technology, professional development on how to incorporate technology into teaching and

learning, and providing time for professional development (Crompton, 2015). Implementing this domain surrounds the teaching of tools and may be more comfortable to principals. This would be in alignment with Metcalf and Lafrance 2013 study that demonstrated principals are most comfortable with basic tools.

A possible reason the competency *Digital Age Learning Culture* has the highest representation in Texas university preparation programs might be related to the low level of technology competency required to use technology tools as a substitution for other tools. According to the *SAMR model* for evaluating the technology level of use in a classroom, substitution is the lowest form of technology use when the task, such as writing, is the same but the tools are different (Crompton, 2015). Professors might not have the technology competence or professional development to instruct courses utilizing the higher levels of augmentation, modification, or redefinition. This is in alignment with the body of literature in which Hayashi and Fisher-Adams (2015) noted that professors' personal use of technology to teach the course was often based on self-determination and not part of required coursework (2015).

The present study showed *Systemic Improvement* to have the second largest representation of instruction among principal preparation programs at 24%. A possible reason this domain has higher representation than all but the *Digital Age Learning* competency is its association with the required campus improvement plan principals have to complete. *Systemic Improvement* calls for the utilization of technology to continuously improve the organization through information and technology resources (ISTE, 2009). Campus Improvement Plans, one of the required components of the No Child Left Behind Act of 2001, have been a working part of principal's job duties ever since. Following McLeod's (2017) recommendation which suggest aspects of technology leadership should be woven into every part of school administration as

opposed to being separate, universities might be able to follow suit and intertwine aspects of *Systemic Improvement* with Campus Improvement Plans.

The present study showed *Digital Citizenship* to be represented in principal preparation programs at 16%. Defined by the International Society for Technology in Education (2009) as modeling and facilitating understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture, one possible reason for limited presence might be due to rapidly changing laws. Crompton (2015) describes the challenge of *Digital Citizenship* as being increasingly complex and ubiquitous in nature. Wadhwa (2014) supports this possibility when stating laws and ethics simply cannot keep up with the pace of technology. Another possible reason presence of the technology leadership component *Digital Citizenship* may be limited is simply it not being present in written course descriptions and available syllabi, but found as a sub-section among some education law courses.

> Research Question 3: Are there differences in the amount of technology leadership instruction between online, face-to-face, and blended programs in Texas?

The present study found a statistically significant increase of technology leadership components in online courses than face-to-face, blended, and the discovered multiple delivery category. The f- ration value is 3.25853. The p-value is .025538. The result is significant at $p < .05$. There are a few possible reasons technology leadership components are showing a larger presence in online courses than others. Professors teaching online principal preparation programs and their students will naturally increase their computer skills due to constructivism. Fosnot (1996) described constructivist learning as not a static set of truths but "as emergent, developmental, nonobjective, viable constructed explanations humans engaged in meaning making" (p. 10). One possible effect of an online learning environment in conjunction with educational leadership curriculum lends a natural awareness of 21st century learning

environments and technology leadership. Another possible reason technology leadership components are more prevalent in online principal preparation courses lies in the students overall confidence to basic curriculum requirements. Jagger (2014) noted students chose face-to-face courses over online courses when the content is perceived as being difficult. This ties into technology leadership components because the International Society for Technology in Education administrator competencies go above and beyond Texas Education Agency required standards for principal certification (State Board of Education, 2016).

Limitations

The exploratory study was conducted in Texas and was not generalizable to other states, though it may be perceived by individual readers to transfer to their local context if there is viewed to be an alignment between each state's processes and requirements Principal preparation programs that were certification-only were excluded from the study due to the minimum number of required courses. These certification-only programs are considered emergency/alternative certification and the study of these programs is recommended for future research. Appendix B shows the list of programs not included in the study.

Certain subjectivity was present when interpreting course and programmatic information and was a limitation of the study. Any discrepancies among raters were discussed until a consensus of 100% interrater agreement could be reached or the item was eliminated. No items were eliminated. Although operational definitions were provided in the present study for online, face-to-face, blended, and multiple program delivery courses, the placing of courses into these categories were done so by how the university advertised the course. Possible inaccuracies in course descriptions and syllabi due to universities not updating course and program information.

Addressing the Deficit in Technology Leadership Instruction

The present study revealed a deficit in area of technology leadership instruction in Texas principal preparation programs. Out of 622 courses that were analyzed, only 43 had noted evidence of the presence of technology leadership instruction. The current body of literature, discussed in Chapter 2, presented a strong argument supporting the importance of technology leadership among school principals in 21st century learning environments. Although the literature suggests many newly hired principals seek professional development in the area of technology leadership, the purpose of this study focused on how universities in Texas were addressing the issue of technology leadership instruction in principal preparation courses. This portion of Chapter 5 provides some suggestions on how the deficit in technology leadership instruction might be addressed.

The Texas Board of Higher Education stated there is no monitoring of curriculum above that of initial licensure among universities (2017). The curriculum of Texas principal preparation programs are monitored by individual universities based on their pass and fail rate of principal certification exams. The author of the present study served as a principal certification exam writer in Texas during the time of the research and recommends an adjustment to the test writing process to address the deficit of technology leadership instruction. Currently, principal certification exam question writers are given a broad directives that simply states which domain and descriptive statement a question should target. Exam writers, who are independent contractors, write exam questions that then go through supervisors who peer review the question for clarity, grammar, and alignment to the domain assigned. At the time of the present study, questions may be based on any literature 5 years or less in age. It is recommended exam writers be given directives that include more detailed instructions to include technology leadership

questions. The inclusion of question focusing on technology leadership components on Texas principal certification exams would then present a need for universities to update their curriculum. The utilization of the ISTE Administrator Standards by principal certification exam writers would provide universities a framework to consider when updating curriculum. This recommendation is supported by the result of the present study that demonstrated the universities who are currently implementing technology leadership components are using the ISTE Administrator Standards. Although the recommendation to adapt the test writing process is reactive in that released test drive curriculum, it is a small adjustment to the system currently in place.

A second recommendation that would be proactive in nature, would be to create a small research or audit team through the Texas Board of Higher Education in which universities in Texas offering principal preparation programs were examined to ensure current Texas Education Agency Principal Certification Standards, including technology leadership components based on ISTE, are represented in programs. Ideally, the research team could be assembled and implemented after TEA made changes to the principal certification competencies. A research or audit team would be able to obtain deeper data from individual universities than was available in the present study by a single author. The process of utilizing full syllabi and programmatic information to classify curriculum into the ISTE Administrator Standards would be similar to the classification process in the present study. Upon completion of the research, universities could be provided a report containing information on strengths, deficits, suggestions for future growth, and a comparison of their program curriculum with other programs. This recommendation would help universities in Texas offering principal preparation programs prepare their students before the certification exam as opposed to making adjustments post results. Graduate students

exploring various principal preparation programs would have the opportunity to access the report and make curriculum considerations when choosing the university much like they currently conside instructional delivery method, length of program, and cost when choosing a university.

Recommendations for Further Study

The completion of this study presents several recommendations for further study. Throughout the process of replicating methodology in the study by Shrum et al. 2011, the degree of accuracy and detail contained in course descriptions became an area of interest. Some course descriptions contained only the principal competency the course covered while others seemed to give attention to the description. The degree of detail and attention to course descriptions appeared to vary depending on the university. One suggestion for further study is regarding the process and validity of course description creations for principal certification programs in Texas. There is some literature to support this need. Perisic (2014) suggested universities can improve retention and graduation rates by becoming more transparent with enrollment expectations and accurate course descriptions. Coates (2015), supports the argument that many course descriptions are inaccurate and improvement in the area is needed. An exploratory study in the area of course descriptions specifically focusing on Texas principal preparation programs would benefit the field in bringing additional information to the accuracy of the present study.

The present study focused on principal preparation in programs in Texas that were considered traditional in the sense that it was a master degree in education administration with the principal certification. There were 22 alternative programs that were left out due to the minimal amount of courses required because they were certification only. These alternative programs would be an area of future research for presence of technology leadership components.

The National Association of Secondary School Principals state that one in every five principals leaves after one year of service (Principals.org, 2017). A side effect of this result is a shortage of certified administrators to fill positions. Alternative programs, providing a quick method to get future administrators certified, are growing exponentially in the United States (Principals.org, 2017). Future research of Texas principal preparation alternative programs and evidence of technology leadership would greatly benefit the field of leading schools in 21st century environments.

A final area of further research would be to gather and analyze syllabi for all courses in Texas principal preparation programs. An exploratory study that was able to evaluate all syllabi for every course in every program would be of great benefit to discover and bring forth all evidence of presence of technology leadership in Texas principal preparation programs. The present study replicated Schrum's 2011 study in which syllabi, when available, were analyzed. A deeper study would be of larger scale than possible for the timeline and scope of the present study, but would offer beneficial information to the field of learning technology and leading schools in 21st century environments.

APPENDIX A

TEXAS PRINCIPAL DOMAINS, STANDARDS

The Domains

Domain	Domain Title	Approx. Percentage of Test	Competencies Assessed
I.	School Community Leadership	33%	001–003
II.	Instructional Leadership	44%	004–007
III.	Administrative Leadership	23%	008–009

The Standards

Principal Standard I
Learner-Centered Values and Ethics of Leadership: A principal is an educational leader who promotes the success of all students by acting with integrity and fairness and in an ethical manner.

Principal Standard II
Learner-Centered Leadership and Campus Culture: A principal is an educational leader who promotes the success of all students and shapes campus culture by facilitating the development, articulation, implementation, and stewardship of a vision of learning that is shared and supported by the school community.

Principal Standard III
Learner-Centered Human Resources Leadership and Management: A principal is an educational leader who promotes the success of all students by implementing a staff evaluation and development system to improve the performance of all staff members, selects and implements appropriate models for supervision and staff development, and applies the legal requirements for personnel management.

Principal Standard IV
Learner-Centered Communications and Community Relations: A principal is an educational leader who promotes the success of all students by collaborating with families and community members, responding to diverse community interests and needs, and mobilizing community resources.

Principal Standard V
Learner-Centered Organizational Leadership and Management: A principal is an educational leader who promotes the success of all students through leadership and management of the organization, operations, and resources for a safe, efficient, and effective learning environment.

Principal Standard VI
Learner-Centered Curriculum Planning and Development. A principal is an educational leader who promotes the success of all students by facilitating the design and implementation of curricula and strategic plans that enhance teaching and learning; alignment of curriculum, curriculum resources, and assessment; and the use of various forms of assessment to measure student performance.

Principal Standard VII
Learner-Centered Instructional Leadership and Management. A principal is an educational leader who promotes the success of all students by advocating, nurturing, and sustaining a campus culture and instructional program conducive to student learning and staff professional growth.

Competency 001: The principal knows how to shape campus culture by facilitating the development, articulation, implementation and stewardship of a vision of learning that is shared and supported by the school community. The principal knows how to:

A. Create a campus culture that sets high expectations, promotes learning and provides intellectual stimulation for self, students and staff.

B. Ensure that parents and other members of the community are an integral part of the campus culture.

C. Implement strategies to ensure the development of collegial relationships and effective collaboration.

D. Respond appropriately to diverse needs in shaping the campus culture.

E. Use various types of information (e.g., demographic data, campus climate inventory results, student achievement data, emerging issues affecting education) to develop a campus vision and create a plan for implementing the vision.

F. Use strategies for involving all stakeholders in planning processes to enable the collaborative development of a shared campus vision focused on teaching and learning.

G. Facilitate the collaborative development of a plan that clearly articulates objectives and strategies for implementing a campus vision.

H. Align financial, human and material resources to support implementation of a campus vision.

I. Establish procedures to assess and modify implementation plans to ensure achievement of the campus vision.

J. Support innovative thinking and risk taking within the school community and view unsuccessful experiences as learning opportunities.

K. Acknowledge and celebrate the contributions of students, staff, parents and community members toward realization of the campus vision.

Competency 002: The principal knows how to communicate and collaborate with all members of the school community, respond to diverse interests and needs and mobilize resources to promote student success. The principal knows how to:

A. Communicate effectively with families and other community members in varied educational contexts.

B. Apply skills for building consensus and managing conflict.

C. Implement effective strategies for systematically communicating with and gathering input from all campus stakeholders.

D. Develop and implement strategies for effective internal and external communications.

E. Develop and implement a comprehensive program of community relations that effectively involves and informs multiple constituencies, including the media.

F. Provide varied and meaningful opportunities for parents/caregivers to be engaged in the education of their children.

G. Establish partnerships with parents/caregivers, businesses and others in the community to strengthen programs and support campus goals.

H. Communicate and work effectively with diverse groups in the school community to ensure that all students have an equal opportunity for educational success.

I. Respond to pertinent political, social and economic issues in the internal and external environment.

Competency 003: The principal knows how to act with integrity, fairness and in an ethical and legal manner. The principal knows how to:

A. Model and promote the highest standard of conduct, ethical principles and integrity in decision making, actions and behaviors.

B. Implement policies and procedures that promote professional educator compliance with The Code of Ethics and Standard Practices for Texas Educators.

C. Apply knowledge of ethical issues affecting education.

D. Apply legal guidelines (e.g., in relation to students with disabilities, bilingual education, confidentiality, discrimination) to protect the rights of students and staff and to improve learning opportunities.

E. Apply laws, policies and procedures in a fair and reasonable manner.

F. Articulate the importance of education in a free democratic society.

G. Serve as an advocate for all children.

H. Promote the continuous and appropriate development of all students.

I. Promote awareness of learning differences, multicultural awareness, gender sensitivity and ethnic appreciation.

Competency 004: The principal knows how to facilitate the design and implementation of curricula and strategic plans that enhance teaching and learning; ensure alignment of curriculum, instruction, resources and assessment; and promote the use of varied assessments to measure student performance. The principal knows how to:

A. Facilitate effective campus curriculum planning based on knowledge of various factors

(e.g., emerging issues, occupational and economic trends, demographic data, student learning data, motivation theory, teaching and learning theory, principles of curriculum design, human developmental processes, legal requirements).

B. Facilitate the use of sound, research-based practice in the development, implementation and evaluation of campus curricular, co-curricular and extracurricular programs.

C. Facilitate campus participation in collaborative district planning, implementation, monitoring and revision of curriculum to ensure appropriate scope, sequence, content and alignment.

D. Facilitate the use of appropriate assessments to measure student learning and ensure educational accountability.

E. Facilitate the use of technology, telecommunications and information systems to enrich the campus curriculum.

F. Facilitate the effective coordination of campus curricular, co-curricular and extracurricular programs in relation to other district programs.

G. Promote the use of creative thinking, critical thinking and problem solving by staff and other campus stakeholders involved in curriculum design and delivery.

Competency 005: The principal knows how to advocate, nurture and sustain an instructional program and a campus culture that are conducive to student learning and staff professional growth. The principal knows how to:

A. Facilitate the development of a campus learning organization that supports instructional improvement and change through ongoing study of relevant research and best practice.

B. Facilitate the implementation of sound, research-based instructional strategies, decisions and programs in which multiple opportunities to learn and be successful are available to all students.

C. Create conditions that encourage staff, students, families/caregivers and the community to strive to achieve the campus vision.

D. Ensure that all students are provided high-quality, flexible instructional programs with appropriate resources and services to meet individual student needs.

E. Use formative and summative student assessment data to develop, support and improve campus instructional strategies and goals.

F. Facilitate the use and integration of technology, telecommunications and information systems to enhance learning.

G. Facilitate the implementation of sound, research-based theories and techniques of teaching, learning, classroom management, student discipline and school safety to ensure

a campus environment conducive to teaching and learning.

H. Facilitate the development, implementation, evaluation and refinement of student services and activity programs to fulfill academic, developmental, social and cultural needs.

I. Analyze instructional needs and allocate resources effectively and equitably.

J. Analyze the implications of various factors (e.g., staffing patterns, class scheduling formats, school organizational structures, student discipline practices) for teaching and learning.

K. Ensure responsiveness to diverse sociological, linguistic, cultural and other factors that may affect students' development and learning.

Competency 006: The principal knows how to implement a staff evaluation and development system to improve the performance of all staff members, select and implement appropriate models for supervision and staff development and apply the legal requirements for personnel management. The principal knows how to:

A. Work collaboratively with other campus personnel to develop, implement, evaluate and revise a comprehensive campus professional development plan that addresses staff needs and aligns professional development with goals.

B. Facilitate the application of adult learning principles and motivation theory to all campus professional development activities, including the use of appropriate content, processes and contexts.

C. Allocate appropriate time, funding and other needed resources to ensure the effective implementation of professional development plans.

D. Implement effective, appropriate and legal strategies for the recruitment, screening, selection, assignment, induction, development, evaluation, promotion, discipline and dismissal of campus staff.

E. Use formative and summative evaluation procedures to enhance the knowledge and skills of campus staff.

F. Diagnose campus organizational health and morale and implement strategies to provide ongoing support to campus staff.

G. Engage in ongoing professional development activities to enhance one's own knowledge and skills and to model lifelong learning.

Competency 007: The principal knows how to apply organizational, decision-making and problem-solving skills to ensure an effective learning environment. The principal knows how to:

A. Implement appropriate management techniques and group process skills to define roles,

assign functions, delegate authority and determine accountability for campus goal attainment.

B. Implement procedures for gathering, analyzing and using data from a variety of sources for informed campus decision making.

C. Frame, analyze and resolve problems using appropriate problem-solving techniques and decision-making skills.

D. Use strategies for promoting collaborative decision making and problem solving, facilitating team building and developing consensus.

E. Encourage and facilitate positive change, enlist support for change and overcome obstacles to change.

F. Apply skills for monitoring and evaluating change and making needed adjustments to achieve goals.

Competency 008: The principal knows how to apply principles of effective leadership and management in relation to campus budgeting, personnel, resource utilization, financial management and technology use. The principal knows how to:

A. Apply procedures for effective budget planning and management.

B. Work collaboratively with stakeholders to develop campus budgets.

C. Acquire, allocate and manage human, material and financial resources according to district policies and campus priorities.

D. Apply laws and policies to ensure sound financial management in relation to accounts, bidding, purchasing and grants.

E. Use effective planning, time management and organization of personnel to maximize attainment of district and campus goals.

F. Develop and implement plans for using technology and information systems to enhance school management.

Competency 009: The principal knows how to apply principles of leadership and management to the campus physical plant and support systems to ensure a safe and effective learning environment. The principal knows how to:

A. Implement strategies that enable the school physical plant, equipment and support systems to operate safely, efficiently and effectively.

B. Apply strategies for ensuring the safety of students and personnel and for addressing emergencies and security concerns.

C. Develop and implement procedures for crisis planning and for responding to crises.

D. Apply local, state and federal laws and policies to support sound decision making related to school programs and operations (e.g., student services, food services, health services, transportation).

APPENDIX B

ISTE ADMINISTRATOR STANDARDS

I. *Leadership Vision* - Educational Administrators inspire and lead development and implementation of a shared vision for comprehensive integration of technology to promote excellence and support

   a. Inspire and facilitate among all stakeholders a shared vision of purposeful change that maximizes use of digital-age resources to meet and exceed learning goals, support effective instructional practice, and maximize performance of district and school leaders

   b. Engage in an ongoing process to develop, implement, and communicate technology-infused strategic plans aligned with a shared vision

   c. Advocate on local, state and national levels for policies, programs, and funding to support implementation of a technology-infused vision and strategic plan.

II. *Digital Age Learning Culture* - Educational Administrators create, promote, and sustain a dynamic, digital-age learning culture that provides a rigorous, relevant, and engaging education for all students.

   a. Ensure instructional innovation focused on continuous improvement of digital-age learning

   b. Model and promote the frequent and effective use of technology for learning

   c. Provide learner-centered environments equipped with technology and learning resources to meet the individual, diverse needs of all learners

   d. Ensure effective practice in the study of technology and its infusion across the curriculum

   e. Promote and participate in local, national, and global learning communities that stimulate innovation, creativity, and digital age collaboration

III. *Excellence in Professional Practice* - Educational Administrators promote an environment of professional learning and innovation that empowers educators to enhance student learning through the infusion of contemporary technologies and digital resources.

   a. Allocate time, resources, and access to ensure ongoing professional growth in technology fluency and integration

   b. Facilitate and participate in learning communities that stimulate, nurture and support administrators, faculty, and staff in the study and use of technology

   c. Promote and model effective communication and collaboration among stakeholders using digital age tools

d. Stay abreast of educational research and emerging trends regarding effective use of technology and encourage evaluation of new technologies for their potential to improve student learning

IV. *Systematic Improvement* - Educational Administrators provide digital age leadership and management to continuously improve the organization through the effective use of information and technology resources.

a. Lead purposeful change to maximize the achievement of learning goals through the appropriate use of technology and media-rich resources

b. Collaborate to establish metrics, collect and analyze data, interpret results, and share findings to improve staff performance and student learning

c. Recruit and retain highly competent personnel who use technology creatively and proficiently to advance academic and operational goals

d. Establish and leverage strategic partnerships to support systemic improvement

e. Establish and maintain a robust infrastructure for technology including integrated, interoperable technology systems to support management, operations, teaching, and learning

V. *Digital Citizenship* - Educational Administrators model and facilitate understanding of social, ethical and legal issues and responsibilities related to an evolving digital culture.

a. Ensure equitable access to appropriate digital tools and resources to meet the needs of all learners

b. Promote, model and establish policies for safe, legal, and ethical use of digital information and technology

c. Promote and model responsible social interactions related to the use of technology and information

d. Model and facilitate the development of a shared cultural understanding and involvement in global issues through the use of contemporary communication and collaboration tools

VI. *Social, Legal, and Ethical Issues*.

a. Ensure equity of access to technology resources that enable and empower all learners and educators.

b. Identify, communicate, model, and enforce social, legal, and ethical practices to promote responsible use of technology.

c. Promote and enforce privacy, security, and online safety related to the use of technology.

d. Promote and enforce environmentally safe and healthy practices in the use of technology.

e. Participate in the development of policies that clearly enforce copyright law and assign ownership of intellectual property developed with district resources.

APPENDIX C

ALTERNATIVE CERTIFICATION PROGRAMS

Program Name	Reason for Exclusion
Region 01 Education Service Center	Alternative Certification
Region 02 Education Service Center	Alternative Certification
Region 03 Education Service Center	Alternative Certification
Region 04 Education Service Center	Alternative Certification
Region 05 Education Service Center	Alternative Certification
Region 06 Education Service Center	Alternative Certification
Region 11 Education Service Center	Alternative Certification
Region 12 Education Service Center	Alternative Certification
Region 13 Education Service Center	Alternative Certification
Region 14 Education Service Center	Alternative Certification
Region 18 Education Service Center	Alternative Certification
Region 19 Education Service Center	Alternative Certification
Region 20 Education Service Center	Alternative Certification
Harris County Department of Education	Alternative Certification
I teach TEXAS	Alternative Certification
Rice Education Entrepreneurship Program	Master Degree in Education Business
Houston ISD	Alternative Certification
21st Century Leadership	Alternative Certification
Our Lady of the Lake University	Master Teacher of Science Graduate Degree
Baylor University	Master Degree in Higher Education Leadership
Abilene Christian University	Master Teacher of Reading
Teachers for the 21st Century	Teacher program.

APPENDIX D

CODE SHEET RESULTS

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
online	Social and Cultural Influences	This course is designed to present broad base of knowledge about culture and learning. Approaches, materials, and research will be investigated. Specific items to be covered include, racism, prejudices, stereotypes, culture, self-awareness, biases in the media and diversity.			X			
online	Multicultural Education	The purpose of this course will be to critically examine variables of race, power, legitimacy, cultural competence, poverty, disability, ethnicity, gender, age, language, and other factors impacting learning in Texas, the United States and globally in public education systems (PK-12). Emphasis will be placed on varied leadership styles and skills needed to provide effective leadership for 21st century schools	Principal Preparation Programs are charged with the responsibility of educating and preparing aspiring schools leaders to successfully lead 21st Century Schools.					X
online	Leading the Learning Community	This course is the capstone course that develops candidates for EXEMPLARY school leadership as evidenced by student knowledge, dispositions, and performance ability to promote success of all students by exercising visionary, collaborative, instructional, organizational, political and globally competent leadership.	One subject that can be used as possible research topic is 21st century learning		X			
online	Leading The Community Practicum	This course is designed to develop candidates for school leadership by providing opportunities to synthesize, practice, and apply knowledge from principal preparation coursework in the real world setting of functioning schools. Practice-based coursework assignments related to each standard of school building leadership are synthesized in a theory-based, reflective document that serves as a comprehensive program examination of preparedness for school building leadership	Participate in the location and utilization of computers • Review school/district management information systems				X	

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
Online/F2F/ Blended	Cultural Foundations	The course will examine the social and cultural foundations of American education and how these foundations interact with the current historical, social, and political forces in shaping American education. Special emphasis will be given to the opportunities for students to investigate special educational problems and issues	The International Society for Technology in Education is a nonprofit professional organization dedicated to the improvement of education through computer-based technology.		X			
F2F	Multicultural Populations	The course examines cultural context of relationships, issues, and trends in a multicultural and diverse society. An emphasis is placed on a knowledge base related to theories, skills, and models of diversity utilized in working with culturally diverse populations cognitions, feelings, and behaviors regarding race, culture, and religious diversity.	Chapter 7 Twenty-First Century: Post-Racial Society?					X
Online	Curriculum Planning and Development	This course provides an overview of the curriculum planning and development process for classroom instruction.	Research software application to curriculum planning and development in your district or another district and address advantages and liabilities involved in implementation.			X		
Online	Fundamentals of Leadership and Technology	This course provides students the opportunity to construct a foundation of leadership through fundamental theories of leadership. Students define their own purpose of leadership and begin to develop the basic skills required to build communities that support learning for all students. Special emphasis is given to leadership as relationships between and among people and systems.	International Society for Technology in Education (ISTE) and the National Council for Accreditation of Teacher Education have established National Education Technology Standards for Coaches.	**X**	X	X	X	X

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
Online	Instructional Leadership	This course emphasizes techniques for improving instruction and learning through the application of the research on effective schools and on models of instruction. Topics include leadership related to curriculum, instruction, supervision, and theories and methods for adult learning and professional development.	Learning Theory in 21st Century Classrooms. Learning theory in the 21st century classroom. Smart Blog, Center for Teaching Quality		X	X		
	Technology in Today's Classroom	This course will develop technology literacy skills for teaching. Students demonstrate use of technology in communicating, collaborating, and teaching. Knowledge and proficiencies needed to confidently incorporate existing and emerging educational technologies into candidates' future classrooms will be taught. Integrating technology applications to support teaching.				X		
Online	Administration of Special Programs	This course focuses on planning, implementation, evaluation, and improvement of a variety of school-supported special programs including special and compensatory education, bilingual and ESL, adult and continuing education, and career technology education.						
Online	Technology and Social Communities at School	Special in-depth study of technology and social communities at school	Technology and Social Communities					
Online/F2F	Educational Technology	Integrating Educational Technology. Study theoretical/ practical characteristics of technology integration strategies, including using instructional software, using technology media, and integrating technology into curriculum	Technology integration, instructional software, technology media, technology into curriculum	X		X		

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
F2F	Educational Technology for Administrators	This course serves the modern administrator regarding problems of use, selection, and management of administrative educational technology at the campus level.		X			X	
Online	Managing School Resources	Administration School. Function, organization, physical equipment, campus budgeting, personnel, resource utilization, financial management and technology use for safe and effective learning environment.	Managing technology as a resource				X	
Online/F2F	Special Programs	In preparation of school administrators for 21st century issues, acknowledgement given to increased demands by public and profession to increase effectiveness of all aspects of school programs to ensure learners become successful. The challenge is for school leaders to deploy local, state, and federal funding programs efficiently to provide all available services in a legally responsible manner, ensuring optimal achievement of children	21st century				X	
Online	Systems Theory and Applications	This class will provide an overview, background, and foundation in systems theory and performance technology. This focus will assist in developing a vision of teaching and learning with technology as a major component. Topics covered include performance technology, general systems theory, needs assessment, and change management. A class project, including needs assessment and final report of potential solutions, is required of students.	Performance technology	X	X	X		
Online	Special Populations and Programs	Study is made of special programs offered in public schools including special and compensatory education, bilingual and ESL education, adult and continuing education, and vocational and technical education.	Technical Education		X			

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
online	Pedagogy Professional Responsibility	This course discusses professional roles and responsibilities of the Master teacher in 21st Century and examines legal/ethical requirements of the profession. For experienced teachers, PPR is explored from administrator's point of view including projects such as designing faculty professional development, evaluating pedagogical skills, educational professionalism.	21st Century	X		X		
Online/F2F/ Blended	Research Literature and Technology	Designed to build competencies in Christian school short and long term planning skills. Course content includes defining vision, developing mission statements, creating assessment tools, and determining core values and elements of a Christian school. Participants gain insights into evaluation and development of action plans to achieve expected outcomes.	Technology	X				
Online/F2F	Differentiated Learning Strategies	Provides knowledge base for teaching special populations in today's diverse classroom. Topics include: characteristics of learners; legal and ethical issues; planning for instruction; strategies for teaching the content areas; integration of relevant technology; and an introduction to formal and informal assessments.	Integration of relevant technology		X			
Online/F2F	Technology in Educational Settings	Use of technology and instruction in various curricular areas. This course focuses research and implementation of technology in EC-12 settings. There is also emphasis on funding educational technology through grants.			X		X	
Online/F2F	Research Literature Technology	Study of the resources, technology, and form for the purpose of research and preparation of formal papers in the student's field of study					X	

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
F2F	School Community Relations	Political theory and application of political skills to build internal and external support for the campus and district. Strategies for strengthening school/community relations utilizing verbal and non-verbal communication skills in coalition building as well as school/business partnerships. Communicating effectively with students, parents, staff, community, and media to project positive image. Politics of school governance and board relations.	Communicating via media					X
F2F	Internship In Educational Leadership	Administrator's internship in a public or "recognized" school. The internship provides opportunity to develop and enhance leadership skills under supervision of a person holding a Texas Education Agency Certificate with three years of experience at the level of assignment. Planning, development, and implementation effective instructional system. Use of research findings, time, staff, advanced technologies, community resources, and financial means to maximize student outcomes. Presentations to boards of program preparation personnel and practitioners. Field-based assessments by field and preparation program personnel. Peer assessment.	Use of advanced technologies to maximize student outcomes		X			
F2F/Online	Administration of School Facilities and Finance	This course deals with systematic planning of school facilities including school finance and technology and its applications to curricular outcomes. Finance will include theory and practices of business management, basic accounting, internal accounting procedures and Texas public school finance. Additionally, theory and understanding of how to build a budget for a school campus is included.	Technology and its application				X	

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
F2F/Online	Leadership in School Technology for Administrators	This course includes expectations for technology use; technology-rich school improvement processes; technology integration among faculty and staff; utilization of technology to assess, analyze and interpret student performance data to design, assess and modify students instruction; improve staff development; utilize technology based management systems to access and maintain school records and data; and the utilization of various media and formats to communicate and collaborate with stakeholders.		X	X	X	X	X
F2F	Research in Education	A series of classes that explore contemporary issue and/or trend in teaching, learning, and educational leadership and scholars who have contributed to our current understanding of the selected topic. Each class in the seminar series explores particular issues related to the topic. Specific offerings will target critical current themes such as: information literacy in the role of contemporary education, the cognitive neuroscience of learning, and the like and will be listed as, for example, EDLE 70023: The evolving role of technologies in the PK12 classroom-- what it means for students, teachers, and leaders. Course may be repeated for credit once with a different topic/emphasis.			X			

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
F2F	Engaging Community & Culturally Responsive Practice	It will enable leaders to interface with a variety of community members and organizations. Moreover, this course will address working with classrooms, schools, and the broader community in ways that align with culturally responsive practice. Schools exist as part of the very heartbeat of a community, interfacing with not only the students and families whom they serve, but virtually all other critical agencies and entities on a daily basis: businesses & business organizations, neighborhood associations, community organizations, charitable foundations, child service providers, city/governmental and public service/safety organization, and faith-based organizations. The increasing and evolving complexities imposed by economic need and social challenges/demands make the cohesive planning and collaboration of school and community leaders one of the 21st Century imperatives.						X
F2F	Trends in Teaching, Learning, & Leadership*	A series of classes that explore a contemporary issue and/or trend in teaching, learning, and educational leadership and the scholars who have contributed to our current understanding of the selected topic. Each class in the seminar series explore particular issues related to the topic. Specific offerings will target critical current themes such as: information literacy in the role of contemporary education, the cognitive neuroscience of learning, and the like and will be listed as, for example, EDLE 70023: The evolving role of technologies in the PK12 classroom-- what it means for students, teachers, and leaders. Course may be repeated for credit once with a different topic/emphasis.			X			

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
Online	Leadership of Campus Resources	Integrated continuous improvement processes supported by optimal allocation of financial, human, technological, facility, time, and other campus resources. Special emphasis on developing a safe and engaging school learning environment.	Technology resources allocation				X	
Hybrid	Multicultural Education for Educators	Examines multicultural relations in American society and explores solutions to critical problems confronting schools into the 21st century	Relations in 21st century					X
Online	Technology for Instructional Improvement **	This course is designed for graduate students and includes technology for school improvement. Topics include information connecting learning communities, curriculum integration, staff development, sustainment of infrastructure and planning for the future. The class will have opportunities to work directly with programs on campus.		X	X	X	X	X
F2F	Understanding Environments: Social, Political, Economic, Legal, and Technological.	Concepts of the internal and external environment of educational organizations are explored. Entry level concepts are presented in areas of school environments.						X
F2F	Emerging Issues in Education	Topics such as the role of technology in contemporary education; school law and political influences in education; trends in school management; professional codes of ethics in education and other timely and relevant topics are addressed with emphasis on current professional literature, professionalism, and the role of the classroom teacher.			X			

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
Hybrid	Administrative Processes in Schools	Management processes including planning and administrative functions, site-based management, budget, facilities, technology, insurance, purchasing, human resources for certified and non-certified personnel, relationship of business management functions to teaching and learning environment.					X	
F2F	Innovations in Teaching and Learning	This course is designed to engage school leadership candidates in an exploration of the current models of innovation that are most prevalent in the field of education. Topics may include: computer-mediated curriculum, blended learning, global education, "classrooms without walls," expeditionary learning, and other evolving educational models. Students will visit, in person or virtually, a variety of these models and analyze the strengths, challenges, and possible impact of the innovations in the maximizing of student learning			X			X
Online	Orientation To Administration And Supervision	This course is designed to provide an orientation to the primary components of the Administration and Supervision Program. Students will be introduced to the program's progression and degree completion requirements. Field experience, electronic resources, e-portfolio, and internship will be discussed.					X	
F2F	Tech Assist Tools/Issue/ Access	Technology, Assistive Tools and Issues of Access (2-1) Distance Learning for EC-12 students, both in and out of the traditional school setting. Assistive technology tools and techniques for the classroom teacher.			X	X	X	

(table continues)

Delivery	Course Title	Course Description	Technology Found in Syllabus	Visionary Leadership	Digital Age Learning Culture	Excellence in Professional Practice	Systemic Improve-ment	Digital Citizenship
F2F	EDT 5372 Web Tools for Constructive Classroom	Web Tools for the Constructivist Classroom (2-1) Focus on web communication tools and production of web-based content in support of constructivist EC-12 classroom learning. Creation and implementation of web content as an instructional tool, a publishing venue for student work, and information source for parents. Portfolio development and peer mentoring strategies are addressed.			X			
F2F	Instructional Leadership for Diverse Learners	His course provides a study of the delivery of differentiated instruction for diverse learners to include Bilingual Education/ESL, Gifted & Talented, Migrant, Special Education, 504, Career & Technology Education (CATE), and other special programs. Emphasis is placed on the principal's role of elementary and secondary school programs. Applicable laws, policies, and regulations will be emphasized.		X				
F2F	The Principal ship	Management of the internal organization of the schools with respect to scheduling, student grouping, staffing, curriculum, student progress systems, special programs, and grading/reporting systems; community relations at the school site; legal aspects of school site management; and use of microcomputers.					X	
Online	Educational Leadership and Technology	Visionary leadership for integration of technology into the school-wide instructional process to enhance student achievement. Technology-related issues and considerations for school administrators including ethics, policies, infrastructure, and financing and educator preparation will be addressed.		X	X	X	X	X

APPENDIX E

IRB EXEMPTION

UNT

UNIVERSITY OF NORTH TEXAS

A green light to greatness.

THE OFFICE OF RESEARCH INTEGRITY AND COMPLIANCE

September 13, 2017

Dr. Cathleen Norris
Student Investigator: Michelle Raegan Hall
Department of Learning Technologies
University of North Texas

RE: Human Subjects Application No. 17-400

Dear Dr. Norris:

In accordance with 45 CFR Part 46 Section 46.101, your study titled "Presence of Technology Leadership Instruction in Texas University Principal Preparation Programs in Texas: An Exploratory Study" has been determined to qualify for an exemption from further review by the UNT Institutional Review Board (IRB).

No changes may be made to your study's procedures or forms without prior written approval from the UNT IRB. Please contact The Office of Research Integrity and Compliance at 940-565-4643, if you wish to make any such changes. Any changes to your procedures or forms after 3 years will require completion of a new IRB application.

We wish you success with your study.

Sincerely,

Chad Trulson, Ph.D.
Professor
Chair, Institutional Review Board

CT:jm

1155 Union Circle, #310979 | Denton, Texas 76203-5017 | TEL: 940.369.4643 | FAX: 940.565.4277
TTY: 940.369.8652 | http://research.unt.edu

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